

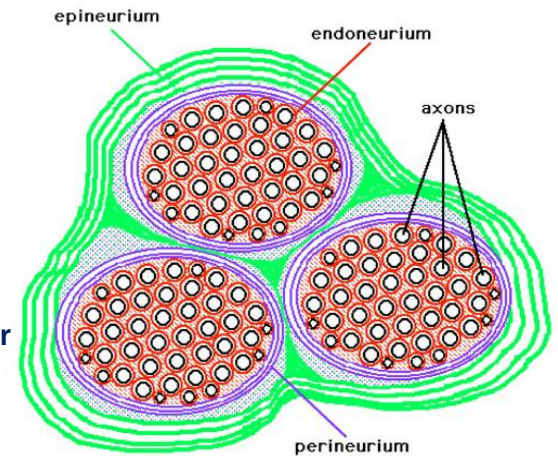
Peripheral Nerve Injury:

Etiology:

- 1-Congenital (e.g. meningocele) 2-Traumatic (fractures)
- 3-Compression (e.g. carpal tunnel syndrome) 4-Iatrogenic

Layers of the connective tissue of the nerve:

- 1-**Epineurium**: outermost layer surrounding the nerve.
- 2-**Perineurium**: layer surrounding fascicles
- 3-**Endoneurium**: layer enclosing myelin sheath of the nerve fiber



Types of nerve injuries:

- 1-**Neurotmesis**: Cut of the whole nerve
 - 2-**Axonotmesis**: damage of axon & endoneurium with intact perineurium & epineurium
 - 3-**Neuropraxia**: Intact all nerve and sheath but there is a loss of function (usually due to compression)
- **Closed injuries are more dangerous than open injuries as in closed injuries destruction of the fibers occurs at different segments so fibrosis is more causing inhibition of regeneration**

Diagnosis:

1) Clinical:

- a) **Motor affection**: 1-Paralysis (loss of muscle power) 2- Loss of muscle tone 3-Atrophy

****Grades of muscle power:**

0	No contraction	3	Full range of motion against gravity
1	Flickers (Slight contraction, no movement)	4	Full range of motion against mild resistance
2	Full range of motion gravity elimination	5	Full muscle power (against full resistance)

b) Sensory loss:

- **Types of sensation**: ▪**Superficial** (pain, touch & temperature) ▪**Deep** (position & movement)
▪**Cortical** (tactile localization & discrimination)

c) Loss of reflexes: superficial and deep

d) Autonomic: ▪Sudomotor (loss of sweating → dry skin) ▪Vasomotor (pallor, cyanosis & atrophy)

2) **Electro-diagnosis**: ▪Nerve conduction ▪E.M.G. (Electromyography)

Treatment:

Neuropraxia: recovery occurs spontaneously in few days or weeks

Axonotmesis: recovery in few months

Neurotmesis: no spontaneous recovery, need operative treatment

****Care of the paralyzed limb**: ▪Care of skin ▪Physiotherapy (to prevent stiffness) ▪Splint

1-**Nerve repair (Neurorrhaphy)**

-Suturing of the both ends of the nerve: proximal (neuroma) & distal (glioma)

-Repair should be **tension-free**, this is done by:

- Bone shortening
- Re-routing of nerve (as rerouting of ulnar n. to the front of medial epicondyle)
- Sacrificing of some less important branches
- Nerve graft and nerve transfer

***If there are adhesions around nerve → neurolysis**

2) **Reconstruction** (see below)

-In failure of repair and old neglected cases (also in poliomyelitis and cerebral palsy)

-It includes 1-Correction of deformity 2-Stabilization of joint 3-Restoration of motor power

Nerve entrapment:

Cause: space occupying lesions as tumors, inflammation, non-united fractures

Common sites:

- Carpal tunnel syndrome: median entrapment neuropathy at the wrist
- Pronator teres syndrome: compression neuropathy of the median nerve at the elbow
- Cubital tunnel syndrome: Pressure on the ulnar nerve at the elbow
- Guyon's canal syndrome: entrapment of ulnar nerve in Guyon canal as it passes through the wrist
- Tarsal tunnel syndrome: compression neuropathy on the tibial nerve (behind the medial malleolus)

Tinel's sign: light percussing over the nerve → elicit a sensation of tingling in its distribution

Investigations: nerve conduction - E.M.G.

Treatment: conservative, surgical release

Poliomyelitis: Viral infection, affects A.H.C., purely motor, asymmetrical, L.M.N.L.

Cerebral palsy:

Non progressive, due to perinatal problems (infections, drugs, difficult labor), U.M.N.L. , immature brain

Treatment of both is Reconstruction

Reconstruction:

I-Correction of deformity:

A) Soft tissues operations

- 1-Tenotomy
- 2-Tenoplasty: lengthening of the tendon as z-plasty of Achilles' tendon in correction of equinus
- 3-Soft tissue release: in contracture of capsule and ligaments

B) Bone operations: "Corrective osteotomy"

- 1-Closed wedge: shortening of the longer side
- 2-Open wedge: lengthening of the shorter side
- 3-Mixed closed & open wedge

II-Joint stabilization:

- 1-Tenodesis: detachment of the tendon and then reattachment of it at different point on the bone
- 2-Bone block: bone graft is placed adjacent to a joint to limit motion of the joint
- 3-Arthrodesis (artificial ankylosis): artificial induction of joint ossification between two bones

III- Restoration of muscle power

-Tendon transfer:

Shifting of a functioning tendon from its original attachment to a new one to restore a lost action
e.g. Correction of flexion deformity of knee by transfer one of the tendons of hamstrings muscle to the extensor side (to act as an extensor tendon)

-Muscle to be transferred should be:

- Powerful enough (at least grade 4)
- Agonist or synergist
- Preserve blood & nerve supply

